IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claim 1 (Original): An adaptive multi-modulus equalization method for an equalizer, comprising the steps of:

storing an input signal;

generating initial values for a plurality of equalizer coefficients;

calculating a constant modulus algorithm (CMA) cost function output according to a CMA with an equalized signal from the equalizer;

estimating a CMA adjustment amount for updating the equalizer coefficients according to the CMA cost function output;

determining modulus of each region for a multi-modulus algorithm (MMA) by statistical analysis of the equalized signal;

switching the equalizer to use the MMA when the CMA cost function output reaches a first threshold, wherein the MMA comprises a plurality of stages determined by thresholds, and the number of regions increases in each subsequent stage;

calculating a MMA cost function output according to the MMA with the equalized signal and modulus of each region;

estimating a MMA adjustment amount for updating the equalizer coefficients according to the MMA cost function output;

determining modulus of each region for the subsequent stage of the MMA by statistical analysis of the equalized signal;

switching the equalizer to the subsequent stage of the MMA when the MMA cost function output reaches the threshold corresponding to the current stage;

repeating the steps of calculating the MMA cost function output, determining modulus of each region, and switching the equalizer to the subsequent stage until the MMA cost function output reaching a preset value; and

fixing the number of regions and equalizer coefficients to equalize the input signal when the MMA cost function output has reached the preset value.

Claim 2 (Original): The method as claimed in claim 1 further comprising the steps of:

phase recovering and non-linear transforming the equalized signal into a recovered signal; and

inputting the recovered signal to a decision feedback equalizer.

Claim 3 (Original): The method as claimed in claim 1 wherein the CMA cost function output and the MMA cost function output are calculated by two second-order discrete cost functions.

Claim 4 (Original): The method as claimed in claim 1 wherein the constant modulus algorithm (CMA) is implemented by a steepest gradient descent algorithm.

Claim 5 (Original): The method as claimed in claim 1 wherein the multi-modulus algorithm (MMA) is implemented by a steepest gradient descent algorithm.

Claim 6 (Currently amended): An adaptive multi-modulus equalizing system, comprising:

an equalizer, generating an equalized signal from an input signal according to equalizer coefficients;

a first coefficient generator, estimating a first adjustment amount by calculating a first cost function output according to a constant modulus algorithm (CMA);

a second coefficient generator, estimating a second adjustment amount by calculating a second cost function output according to a multi-modulus algorithm (MMA); and

a multiplexer connected to the equalizer, selecting either the first adjustment amount or the second adjustment amount with which to update the equalizer coefficients depending on a first threshold;

wherein the first coefficient generator calculates the first cost function output from the input signal and the equalized signal.

Claim 7 (canceled).

Claim 8 (Currently amended): ~~The system as claimed in claim 6,~~

An adaptive multi-modulus equalizing system, comprising:

an equalizer, generating an equalized signal from an input signal according to equalizer coefficients;

a first coefficient generator, estimating a first adjustment amount by calculating a first cost function output according to a constant modulus algorithm (CMA);

a second coefficient generator, estimating a second adjustment amount by calculating a second cost function output according to a multi-modulus algorithm (MMA); and

a multiplexer connected to the equalizer, selecting either the first adjustment amount or the second adjustment amount with which to update the equalizer coefficients depending on a first threshold;

wherein the second coefficient generator calculates the second cost function output from the input signal, the equalized signal, and moduli obtained by statistical analysis of the equalized signal.

Claim 9 (Original): The system as claimed in claim 8, wherein the number of moduli used to calculate the second cost function output is incremental when the second cost function output reached a second threshold.

Claim 10 (Original): An adaptive multi-modulus equalization method for an equalizer, comprising the steps of:

storing an input signal;

generating initial values for a plurality of equalizer coefficients;

calculating a constant modulus algorithm (CMA) cost function output according to a CMA with an equalized signal from the equalizer;

estimating a CMA adjustment amount for updating the equalizer coefficients according to the CMA cost function output; and

determining modulus of each region for a multi-modulus algorithm (MMA) by statistical analysis of the equalized signal.

Claim 11 (Original): The method as claimed in claim 10 further comprising the step of switching the equalizer to use the MMA when the CMA cost function output reaches a first threshold, wherein the MMA comprises a plurality of stages determined by thresholds, and the number of regions increases in each subsequent stage.

Claim 12 (Original): The method as claimed in claim 11 further comprising the steps of:

calculating a MMA cost function output according to the MMA with the equalized signal and modulus of each region;

estimating a MMA adjustment amount for updating the equalizer coefficients according to the MMA cost function output; and

determining modulus of each region for the subsequent stage of the MMA by statistical analysis of the equalized signal.

Claim 13 (Original): The method as claimed in claim 12 further comprising the step of switching the equalizer to the subsequent stage of the MMA when the MMA cost function output reaches the threshold corresponding to the current stage.

Claim 14 (Original): The method as claimed in claim 13 further comprising the steps of:

repeating the steps of calculating the MMA cost function output, determining modulus of each region, and switching the equalizer to the subsequent stage until the MMA cost function output reaches a preset value; and

fixing the number of regions and the equalizer coefficients to equalize the input signal when the MMA cost function output has reached the preset value.

Claim 15 (Original): The method as claimed in claim 14 further comprising the steps of:

phase recovering and non-linear transforming the equalized signal into a recovered signal; and

inputting the recovered signal to a decision feedback equalizer.

Claim 16 (Original): The method as claimed in claim 15 wherein the CMA cost function output and the MMA cost function output are two second-order discrete cost functions.

Claim 17 (Original): The method as claimed in claim 10 wherein the CMA is implemented by a steepest gradient descent algorithm.

Claim 18 (Original): The method as claimed in claim 10 wherein the MMA is implemented by a steepest decent algorithm.

Claim 19 (New): An adaptive multi-modulus equalizing system, comprising:

an equalizer, generating an equalized signal from an input signal according to equalizer coefficients;

a first coefficient generator, estimating a first adjustment amount by calculating a first cost function output according to a first algorithm;

a second coefficient generator, estimating a second adjustment amount by calculating a second cost function output according to a second algorithm; and

a multiplexer connected to the equalizer, selecting either the first adjustment amount or the second adjustment amount with which to update the equalizer coefficients depending on a first threshold;

wherein the second coefficient generator calculates the second cost function output from the input signal, the equalized signal, and moduli obtained by statistical analysis of the equalized signal.

Claim 20 (New): The system as claimed in claim 19, wherein the number of moduli used to calculate the second cost function output is incremental when the second cost function output reached a second threshold.